GROWTH IN DEMAND DUE TO COMPETITION

We compare the decade before divestiture (1972-1982) with the period after divestiture (1984-1988).[19] In each period, we divide actual demand growth into two parts:

1. predicted growth: a part due to changes in prices, income, and population and

2. exogenous growth: a (residually-measured) part due to other changes--changes in taste, changes in the market place (such as competitive entry) etc.

If competition shifts the demand curve outward due to advertising, the availability of new products or services, or a heightened awareness of the possibility of telephone service, we would expect to see that shift as an increase in exogenous growth.

Using conventional measures of the responsiveness of demand to changes in price, income, and population, we calculate the rate of growth of exogenous demand. In the 1972-82 period, demand was predicted to grow at an annual rate of 4.06 percent. Actual demand growth averaged 8.92 percent, leaving a growth rate of exogenous demand of 4.86 percent. In the 1984-88 period, demand growth was predicted to average 11.05 percent and actual demand growth averaged 13.44 percent. Thus the growth rate of exogenous demand in the 1984-88 period averaged 2.39 percent. Growth in demand unexplained by changes in price, income, and population averaged 2.47 percentage points lower in the 1984-88 period compared with the 1972-82 period. See Table 2. Table 2A provides the same analysis, comparing the pre-ENFIA period with the post-ENFIA period (1972-78 with 1979-89) and obtains the same qualitative result.

One explanation of this reduction in the growth rate of exogenous demand after divestiture is the growth of bypass. Interstate toll demand is measured as interstate switched access demand after divestiture, and the growth of bypass demand--including MEGACOM and WATS-type services--would mask growth in toll demand after divestiture. To adjust our results for the possibility of bypass, we estimate interstate bypass usage from 1984 through 1990 and add that usage to our measure of switched access demand. Calculation of the bypass adjustment is outlined below. The results are shown in Table 2, where it is evident that adjusting for bypass growth does not reverse our earlier finding: growth in interstate toll demand (adjusted for bypass) unexplained by economic factors averaged 1.13 percentage points lower between the 1984-88 period compared with the 1972-82 period.

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[19] Again, we treat the post-divestiture period as the competitive period, although the same analysis as that described below yields the same qualitative results if applied to the 1972-78, 1979-1990 periods. To judge the effects of competition on demand growth, it is useful to note that MCI and Sprint advertising was less than $5 million in 1980 compared with $45 million for AT&T (measured in 1986 dollars). Between 1983 and 1984, total annual advertising for AT&T, MCI and Sprint increased from about $100 million to about $150 million (in 1986 dollars). See Michael Porter, op. cit., Figure 23.

TABLE 2

PERIOD	GROWTH IN PRICE	GROWTH IN INCOME/POP	GROWTH IN POP	PRICE EFFECT ELAS= -0.72	INCOME EFFECT ELAS= 0.80	POP EFFECT ELAS= 1.00	TOTAL EFFECT: PREDICTED GROWTH	ACTUAL GROWTH	EXOGENOUS GROWTH	(INCLUDING BYPASS) ACTUAL GROWTH	(INCLUDING BYPASS) EXOGENOUS GROWTH
1972-82	-2.65%	1.28%	1.03%	1.95%	1.02%	1.03%	4.06%	8.92%	4.87%	8.92%	4.87%
1984-88	-10.30%	2.13%	0.97%	8.14%	1.70%	0.97%	11.05%	13.44%	2.39%	14.78%	3.73%
DIFFERENCE	-7.65%	0.85%	-0.06%	6.19%	0.68%	-0.06%	7.00%	4.52%	-2.48%	5.86%	-1.13%

	GNP-PI	PPI INTERSTATE TOLL NOMINAL	PPI INTERSTATE TOLL REAL
1972	50.3	100.0	198.8
1980	86.1	124.6	144.7
1982	100.0	152.0	152.0
1984	108.3	148.8	137.4
1988	123.9	110.2	88.9
1989	129.5	108.3	83.6
GROWTH			
72-82	7.11%	4.28%	-2.65%
72-84	6.60%	3.37%	-3.83%
84-88	3.42%	-7.23%	-10.30%

SOURCES: BLS

	POP	PER-CAPITA REAL INCOME
1960	180,671	$6,036
1970	205,052	$8,134
1972	209,896	$8,562
1980	227,757	$9,722
1982	232,520	$9,725
1984	237,001	$10,419
1988	246,329	$11,337
1989	248,777	$11,531
GROWTH		
1960-82	1.21%	2.30%
72-82	1.03%	1.28%
72-84	1.02%	1.65%
84-88	0.97%	2.13%

SOURCES: 1990 STATISTICAL ABSTRACT:TABLES 2,695
1989 INCOME: 7/90 SURVEY OF CURRENT BUSINESS

LONG LINES MESSAGE VOLUMES AND HOLDING TIMES

	MESSAGES	HOLDING TIME	MINUTES
1962	1,173,079	6.88	8,070,784
1970	2,714,007	7.84	21,277,815
1972	3,216,010	7.83	25,181,358
1980	6,440,602	8.65	55,711,207
1982	6,827,695	8.67	59,196,116
GROWTH			
1962-82	9.21%		10.48%
1972-82	7.82%		8.92%
1970-80	9.03%		10.10%

SOURCE: LONG LINES STATISTICS: 1960-1982

INTERSTATE SWITCHED ACCESS MINUTES

	USAGE	EST BYPASS	TOTAL
1984-Q3	37.5	8.93	46.4
8803	62.1	18.5	80.6
8903	69.7	19.9	89.6
9001	73.2	20.6	93.8
GROWTH			
1984-88	13.44%		14.78%
1984-89	13.20%		14.05%
1984-90	12.93%		13.64%

SOURCE: FCC "TRENDS IN TELEPHONE SERVICE" AUGUST 20, 1990, TABLE 15.

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TABLE 2A

PERIOD	GROWTH IN PRICE	GROWTH IN INCOME/POP	GROWTH IN POP	PRICE EFFECT ELAS= -0.72	INCOME EFFECT ELAS= 0.80	POP EFFECT ELAS= 1.00	TOTAL EFFECT: PREDICTED GROWTH	ACTUAL GROWTH	EXOGENOUS GROWTH	(INCLUDING BYPASS) ACTUAL GROWTH	(INCLUDING BYPASS) EXOGENOUS GROWTH
1972-78	-2.80%	2.16%	0.98%	2.06%	1.73%	0.98%	4.85%	9.95%	5.10%	9.95%	5.10%
1979-89	-5.88%	1.61%	1.01%	4.46%	1.29%	1.01%	6.87%	10.28%	3.41%	10.81%	3.94%
DIFFERENCE	-3.08%	-0.55%	0.02%	2.40%	-0.44%	0.02%	2.02%	0.33%	-1.70%	0.86%	-1.16%

	GNP-PI	PPI INTERSTATE TOLL NOMINAL	PPI INTERSTATE TOLL REAL
1972	50.3	100.0	198.8
1978	72.7	121.9	167.7
1979	78.8	120.8	153.3
1989	129.5	108.3	83.6
GROWTH			
72-78	6.33%	3.36%	-2.80%
79-89	5.09%	-1.09%	-5.88%

SOURCES: BLS

	POP	PER-CAPITA REAL INCOME
1972	209,896	$8,562
1978	222,585	$9,735
1979	225,055	$9,829
1989	248,777	$11,531
GROWTH		
72-78	0.98%	2.16%
79-89	1.01%	1.61%

SOURCES: 1990 STATISTICAL ABSTRACT:TABLES 2,695
1989 INCOME: 7/90 SURVEY OF CURRENT BUSINESS

LONG LINES MESSAGE VOLUMES AND HOLDING TIMES

	MESSAGES	HOLDING TIME	MINUTES
1972	3,216,010	7.83	25,181,358
1978	5,328,034	8.35	44,489,084
1979	5,953,960	8.49	50,549,120
1982	6,827,695	8.67	59,196,116
GROWTH			
1972-78	8.78%		9.95%
1979-1982	4.67%		5.40%

SOURCE: LONG LINES STATISTICS: 1960-1982

INTERSTATE SWITCHED ACCESS MINUTES

	USAGE	EST BYPASS	TOTAL
1984-Q3	37.5	8.93	46.4
8803	62.1	18.5	80.6
8903	69.7	19.9	89.6
9001	73.2	20.6	93.8
GROWTH			
1984-89	13.20%		14.05%
1979-1989	10.28%		10.81%

SOURCE: FCC "TRENDS IN TELEPHONE SERVICE" AUGUST 20, 1990, TABLE 15.

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Bypass Volumes: 1984-90

Total (intrastate plus interstate) bypass minutes were estimated by the RBOCs and GTE in three surveys conducted by the FCC. The results are reported in the FCC

Table 3
Growth in Special Access Lines

	SPECIAL ACCESS LINES
1984	1,128,924
1985	1,320,228
1986	1,760,741
1987	1,995,739
1988	3,192,682
GROWTH	29.68%

Monitoring Report, (July, 1990), Tables 6.1 and 6.3. We multiply those minutes of use by the fraction of minutes which are interstate (1/(1+0.368) = 0.73) from the Huber Report) to obtain interstate switched access minutes of use which are bypassed for the years 1988, and 1889. An estimate for 1984 is calculated by observing the growth rate in special access lines (from the FCC Statistics of Communication Common Carriers, 1984-1988) and assuming the growth rates of special access lines and bypass minutes between 1984 and

1988 are the same. An estimate for 1990 is obtained by extrapolating the 1989 estimates

Table 4
Switched Access Minutes

	INTERSTATE SWITCHED ACCESS MOU	ESTIMATED BYPASS MOU	TOTAL SWITCHED MOU
1984-Q3	37.5	6.5	44.0
88Q3	62.1	18.5	80.6
89Q3	69.7	19.9	89.6
90Q1	73.2	20.6	93.8

using the 1988-89 growth rate. See Tables 3[20] and 4.[21]

We then add to the bypass minutes for the years 1984, 1988, 1989, and 1990, interstate switched access minutes as reported in the FCC Trends in Telephone Service (August 20, 1990), Table 15, to obtain total switched access minutes of use (including bypass minutes). See Table 4.

[20]Source: FCC, Statistics of Communications Common Carriers.

[21]Source: (1) FCC Trends in Telephone Service: 8/20/90, Table 15, (2) FCC Monitoring Reports: adjusted for inter/intra; (3) 1984-q3 bypass from % increase in special access lines; (4) 1990 bypass from 88-89 growth rate.

DEMAND STIMULATION FROM SUBSCRIBER LINE CHARGES AND EXOGENOUS COST CHANGES

LEC interstate revenue requirements recovered from IXCs fell sharply after divestiture due to the increase in subscriber line charges and to the implementation of several exogenous cost changes. Table 5 shows LEC interstate revenue with and without these exogenous changes.[22]

Table 5
Carrier Switched Access Revenue Changes

Period	CCL + TS Revenue (R_0)	Cumulative Exog Cost Changes	Change in Authorized Rate of Return	Change in CPE and IW Rev Req	SLC Revenue	CCL + TS Revenue R_1
1984-85	$14,464,181	$0	$0	$0	($1,296,104)	$15,760,285
1985-86	$14,955,910	($206,574)	$0	($627,112)	($4,484,658)	$20,274,255
1986-87	$13,669,242	($509,107)	($191,916)	($1,836,941)	($3,646,949)	$19,854,155
1988	$13,680,660	($1,090,281)	($343,170)	($1,821,257)	($4,563,679)	$21,499,046
1989 (4-12)	$12,713,833	($1,345,326)	($352,751)	($1,973,689)	($5,676,620)	$22,062,219
1990-91	$12,148,199	($1,744,907)	($339,278)	($2,409,425)	($6,069,004)	$22,710,813

These reductions in revenue requirements caused interstate carrier access prices to fall and, in turn, caused interstate toll prices to fall. The demand stimulation resulting from the reduction in interstate toll prices can be calculated if the price elasticity of demand for interstate toll service and the fraction of IXC cost represented by access charges are known. For simplicity, we assume the demand function for LEC interstate switched access usage has a constant elasticity given by β, so that

$$q_i = A p_i^{\beta} \quad (i = 1,0),$$

and

$$R_i = p_i q_i = p_i \times A p_i^{\beta} = A p_i^{\beta+1} .$$

[22]Source: United States Telephone Association, Ex Parte in CC Docket 87-313, filed 8/6/09, Tables 2 and 5.

It then follows that:

$$\frac{R_1}{R_0} = \left(\frac{p_1}{p_0}\right)^{\beta + 1} ,$$

so that

$$\frac{p_1}{p_0} = \left(\frac{R_1}{R_0}\right)^{\frac{1}{\beta + 1}} .$$

Thus the price change required to obtain a 10 percent revenue change differs from 10 percent. Rather than using a percentage price change calculated in this manner to calculate demand response, we can directly solve for the quantity q_1 which would result from imposing a price increase of the magnitude necessary to increase revenues from R_0 to R_1:

$$\frac{q_1}{q_0} = \left(\frac{p_1}{p_0}\right)^{\beta} = \left(\frac{R_1}{R_0}\right)^{\frac{\beta}{\beta + 1}} ,$$

so that

$$q_1 = \left(\frac{R_1}{R_0}\right)^{\frac{\beta}{\beta + 1}} \times q_0 .$$

The decrease in carrier access revenue due to the reduction in switched access prices caused by the recovery of SLC revenue from end users and the implementation of exogenous cost changes thus causes an interstate usage increase from q_0 to q_1. We will take the difference $q_0 - q_1$ as our measure of interstate switched access demand stimulation caused by the implementation of SLCs and exogenous cost changes. Using data from the recent price cap filings, we see that demand stimulation from SLCs and exogenous cost changes accounts for about 4.7 percentage points of annual growth since 1984. See Table 6.[23] Annual interstate toll growth averaged about 10.5 percent before divestiture (1962-82) and 12.9 percent after divestiture (1984-90).[24] Approximately 4.7 percentage points of the post-divestiture demand growth were due to carrier access charge reductions (stemming from SLCs and exogenous cost changes). Hence regulatory actions by the FCC explain more than the difference in demand growth before and after divestiture.

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[23]Sources: (1) 7/27/90 USTA Ex Parte, CC Docket 87-313, Table 1; (2) 8/6/90 Ex Parte, Table 8; (3) (2)/(1); (4) (1)-(3); and (5) (1)-(4).

[24]AT&T, "Long Lines Statistics, 1960-1982," and FCC, "Trends in Telephone Service," August 20, 1990.

Table 6
Demand Stimulation From SLCs and Exogenous Cost Changes

	BASELINE CL DEMAND (1)	ESTIMATED CL STIM (2)	PERCENT CL STIM (3)	ESTIMATED CL UNSTIM (4)	ANNUAL GROWTH DIFF DUE TO STIM (5)
1984	160,139,810	6,493,672	4.06%	153,646,138	
1988	244,467,327	47,892,584	19.59%	196,574,743	
1989	281,422,756	65,700,270	23.35%	215,722,486	
1990-91	319,457,082	83,216,292	26.05%	236,220,790	
GROWTH:1984-					
1988	11.16%			6.35%	4.80%
1989	11.94%			7.02%	4.91%
1990	12.20%			7.43%	4.77%